BRACHYCEPHALIZATION AND DEBRACHYCEPHALIZATION IN BULGARIA DURING 20TH CENTURY

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ABSTRACT

The present paper is a continuation and extension of a review made in 1989 in an attempt to combine and compare data of different studies, including cephalic dimensions and cephalic index in Bulgarian adult men and women from the end of 19th to the end of 20th century. There were seven nation-wide studies in Bulgaria during 20th century and few local ones. In some of them means of cephalic index is published, in other – only head length and head breadth averages and cephalic index has been estimated by us. The data are analysed by year of birth, not by year of investigation. This analyse presents that cephalic index in Bulgarians increases until the generation born around 1935-1940, than a process of debrachycephalyzation begins. In men born in the end of 19th century the cephalic index was about 79-80, in these born around 1940 – about 83 and falls to 81-82 in men born in 1950-s. In women cephalic index is usually about 0,5% higher. The brachycephalization and the debrachycephalization are due mostly to changes in head breadth, whereas head length remains relatively stabile. Secular changes do not occur uniformly in all regions – in some of them debrachycephalization can not be found until 1991. Despite the secular changes a large territorio-population heterogeneity in cephalic index remains which goes back at least to 18th-19th century. This heterogeneity is probably due to the different components in the ethnogenesis of Bulgarian people and its ethnographic groups.

Key words: *cephalic index, Bulgaria, brachycephalization, debrachycephalization, territorial variations, population diversity*

INTRODUCTION

The anthropological studies of the living population in Bulgaria have more than a hundred years long history and a generalization of the collected during this period data is essential. The present paper is an attempt to combine and compare data of different studies including evidence of cephalic index in Bulgarian adult men and women from the end of the 19th to the end of 20th century, tracing the secular changes. The analysis includes data of ethnic Bulgarians only if possible.

A first variant of this paper only secular changes on national level have been analysed. But in the process of work and discussions with collegues revealed that such analysis is incomplete if not consider territorial diversity of cephalic index in Bulgaria.

First nation-wide anthropologic study in Bulgaria was conducted by acad. St. Vatev in 1899 in soldiers, aged 21 (14). It was before the unification of anthropometry and may be head measurements are slightly underestimated, but it seems that cephalic index is caught accurately. Its values by county

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(*okoliya* – Bulg.) in Southwest Bulgaria are close to these found by Krum Dronchilov 13 years later (2,3). The anthropometry of Dronchilov is quite comparable to modern one. His studies was not nation-wide – they include only Southwest Bulgaria and two counties of Plovdiv ditrict.

Second nation-wide anthropologic study was the study of acad. Methodi Popov around 1940, mostly in young people - university students and soldiers, mean age 22 (9).

Third nation-wide anthropologic study was the study of Aris Poulianos in 1963 (10). The cephalic index in it is estimated as index of means instead as a mean of individual indices. The mean age of individuals studied is 32 years in males and 31 in females. As the study includes people from 19 year to more than 40 years (perhaps 60 years) it is not very fair to adscribe the head measures to the birth cohort 19441 or 19941, but we have not other choice.

The study of Aris Poulianos was followed by the Second nation-wide survey of physical development of the population of Bulgaria carried out by Yanev and collective in 1970-71 (15). It includes data about head length and head breadth in one year age groups up to 24 years and in five year age groups from 20-24 to 60-64. Thus the cephalic index has been estimated in present paper as an index of means. It seems that head length is slightly underestimated and head breadth is more underestimated.

Next anthropometric study was connected around 1975 by Stefan Mutafov and his collective of professional physical anthropologists (**6**). The study includes people of the capital Sofia and 8 other cities in Bulgaria, thus it can therefore be considered representative for the whole country (may be only the measurements are slightly higher because rural-urban differences). The data are in four age groups – 16-20, 21-30, 31-40 and 41 to 55. The cephalic index is not presented in the data published and is estimated in present paper as an index of means.

The third nation-wide survey of physical development of the population of Bulgaria carried out by Slynchev and collective in 1980-82 also includes evidence about head length and head breadth in one year age groups up to 24 years and in five year age groups from 20-24 to 65-70 (12). Thus the cephalic index can be estimated as an index of means. However as the diagrams show (Fig. 1, Fig.2, Fig. 4, Fig. 5), head measurements are taken quite inaccurately, especially head breadth. In the 18 to 19 years old males mean published head breadth is only 132 mm (Fig. 2) – less than mean byzygomatic breadth should be in every European population! Thus the data of head measurements and of head index from this study must by disqualified and not taken seriously.

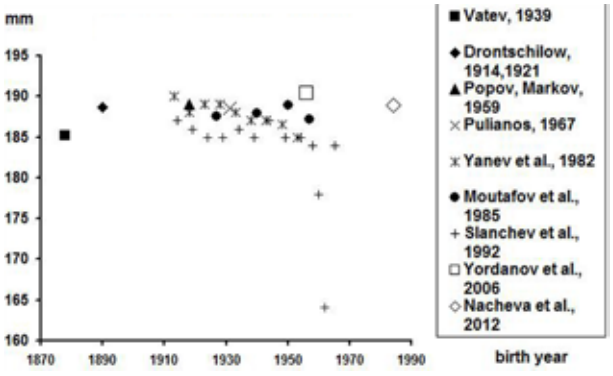

Fig. 1. Head length, males

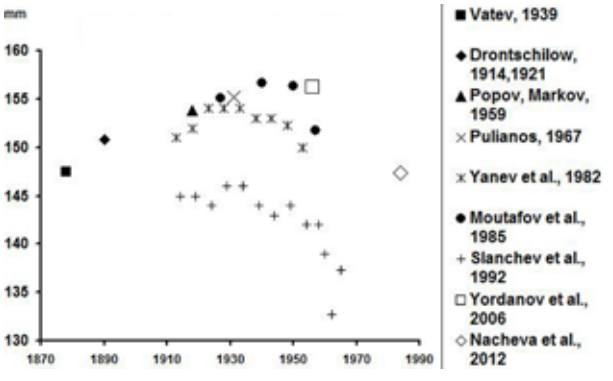

Fig. 2. Head breadth, males

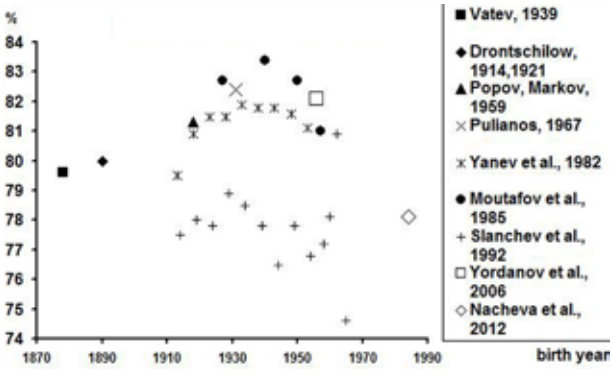

Fig. 3. Cephalic index, males

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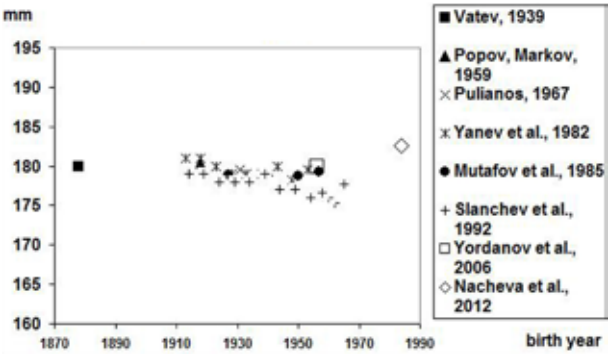

Fig. 4. Head length, females

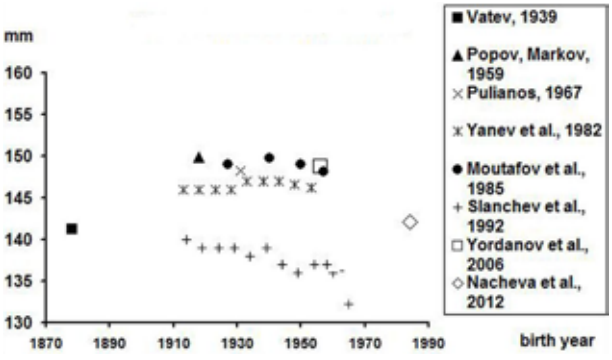

Fig. 5. Head breadth, females

In 1989-1993 the forth national anthropological study has been carried out (16). Only people aged 30 to 40 have been studied. Head measurements have been measured by professional anthropologists – Lucia Kavgazova and Zlatka Filcheva.

There was no other nation wide anthropometric study in Bulgaria, only local ones among children and students. However, for to trace the secular changes of cephalic index to the end of 20th century, cephalic data of 16-17 years old schoolchildren in Sofia, measured in 2001, can be used (**7**). This study has been carried out by professional anthropologist, head measures have been taken by Nely Kondova and Zlatka Filcheva. Since the population of Sofia consists of migrants of whole Bulgaria in the last 130 wears, we can use these data also in our comparisons.

This paper is in fact continuation of another paper of the author on this subject (**13**), in which only data about head measurements in Bulgarian males published until 1980s were analysed. During the past 22 years new data about cephalic index in Bulgaria have been published about the cephalic index in Bulgaria. They confirm the conclusion made in the former review – from the end of 19th century the cephalic index in Bulgaria increases. It reaches its maximum in the generation born around 1940, than there is a tendency for debrachycephalization, both in women as in men (Fig. 3, Fig. 6).

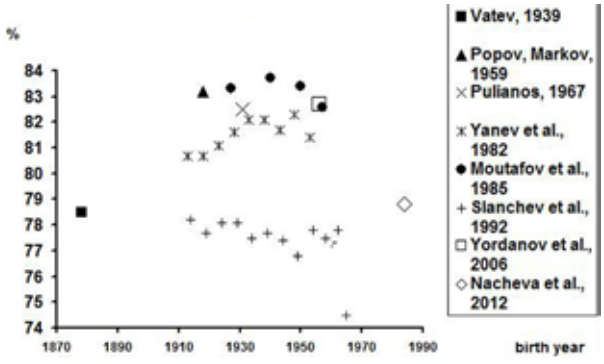

Fig. 6. Cephalic index, females

It seems, that the secular changes of cephalic index in Bulgaria are due mostly to the changes in the head breadth than in the head length. Head length remains around 190 mm in men and slightly less in women but head breadth present the specific curve with maximum in the generations around 1940.

From anatomic viewpoint the changes in head breadth without changes in head length should be connected with changes in head height, but unfortunately there are no reliable data for analysis.

What can be seen on locall level?

Even the first local surveys in the end of 19th century show cephalic index means from 75 (4) to 86 (8) in different Bulgarian populations.

Four of the nation-wide anthropologic studies above include data also on the territorial diversity of cephalic index (14,9,10,16).

At regional level the range of cephalic index means is from 3,5 to 5,4 and the differences persist during 20th century (Table 1, Fig. 7, Fig. 8). The picture becomes even more colorful on a lower level as the former counties (okoliya). In general, cephalic index rises from southeast to northwest and from plains to mountains. Central Balkan ridge is a well defined boundary between brachycephalic populations in north and mesochephalic ones in south of it. In Southwestern Bulgaria, however, the picture is mosaic – in neighboring counties and even in one county

can be found mesocephalic and brachycephalic populations. with sharp boundary between them. This is reflected in the variability of cephalic index on national level. The standard deviation of cephalic index is Bulgarians is about 4, not about 3 as it should be in a homogeneous population. Even Switzerland with its four ethnolinguistic groups showed a standard deviation of 3,8 – lower than in Bulgaria (Table 2).

What are the changes of cephalic index in Bulgaria by regions in 20th century? In five regions the general trend can be observed – brachycephalization, followed by debrachycephalization (Northwestern Bulgaria, Centhral Northern Bulgaria, Rousse, Sofia and Burgas). In four of them, however, the brachycephalization lasts longer and cephalic index in 1991 was higher than in 1963 (Stara Zagora, Plovdiv, Varna, Pirin – Fig. 9).

Characteristic is, however, that despite the brachycephalizatin, debrachycephalization and their different course in different regions, the overall picture remains – brachycephals northwest and mesocephals southeast.

Vatev (14) presents also data on cranial index in materials from the ossuaries in that time. These materials comes from 18th-19th century mostly and

Table. 1. Territorial variations of cephalic index in Bulgaria (males)

Author	Cephalic index			Remark
	Regional maximum, %	Regional minimum,%	Range %	
Vatev, 1939 (study 1899)	81,4 - NWBulgaria	77,9 South Bulgaria	3,5	Local maximum – 83,47 – Tryavna county, local minimum – 75,94 – Tyrnovo-Seymen county – range - 7,53
Popov, Markov, 1959 (study 1938-43)	84,03 - NWBulgaria	78,61 –Pirin (79,35 – Plovdiv, 79,37 – Burgas)	5,42	In 1899 Pirin region was not in Bulgaria
Pulianos, 1967 (stydy 1963)	84,86 - NWBulgaria	79,90 – Varna (79,98 – Pirin, 80,00 – Middle Thrace)	4,96	The division in regions is not the same as in the M.Popov's study
Yordanov et al., 2006 (study 1989-1993)	84,1 - NWBulgaria	79,5 - Burgas	4,6	

Table. 2. Standard deviation of cephalic index (national level)

Country and Period	Standard deviation of cephalic index, males, %	Author
Bulgaria, 1899	3,86	Proper calculation. after Vatev, 1939
Bulgaria, ca. 1940	4,40	Popov, Markov, 1959
Bulgaria, 1963	4,2	Y. Yordanov et al., 2006
Sofia, ca. 2001	3,83	Proper calculation. after Nacheva et al., 2012
Sweden,.ca 1920	3,2	Proper calculation. after Lundborg, Linders, 1926
Norway, ca 1920	3,44	Bryn, Schreiner, 1929
Switzerland,.1930	3,85	Schlaginhaufen,1946

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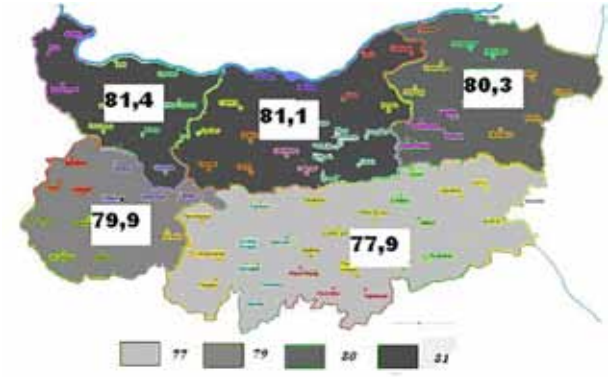

Fig. 7. Cephalic index by regions, 1899, males (Vatev, 1939)

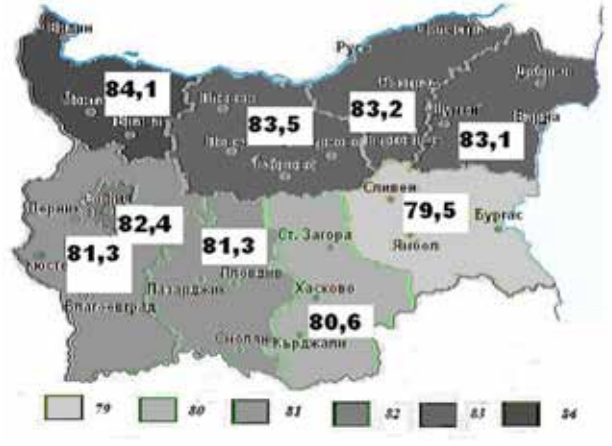

Fig. 8. Cephalic index by regions, ca 1991 (Yordanov et al., 2006)

show mostly the same picture as the living population – the soldiers, studied by him. In four of five regions to compare the difference between cranial and the cephalic index is 1,0-2,0% ie "as in a textbook". Only Northeastern Bulgaria the bone materials are mesocephalic and the soldiers – brachycephalic with

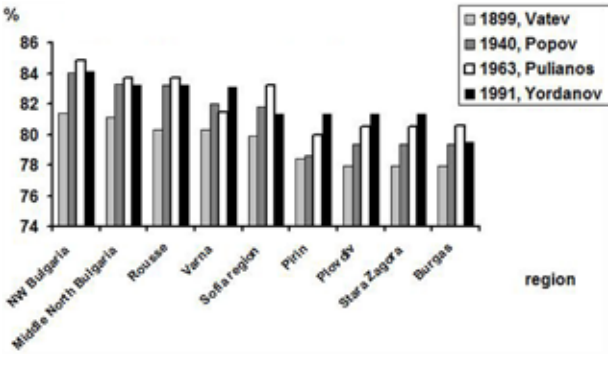

Fig. 9. Cephalic index by regions, males

difference of 4,0% (Fig. 10). The reason is simple – the colonization of Northeastern Bulgaria by the ethnographic group of Balkanji with their high cephalic index.

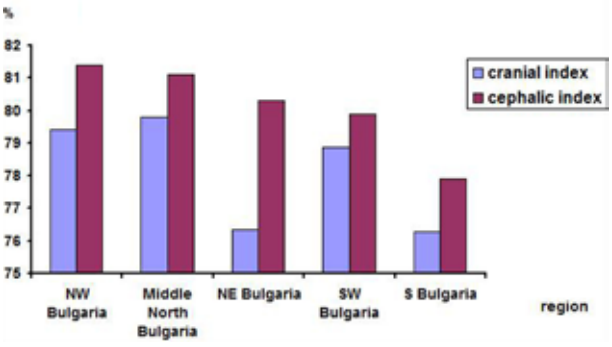

Fig. 10. Cranial and cephalic index by regions after Vatev, 1939

What are the reasons for this heterogenity in a basic index in taxonomy of human populations in Bulgaria is still impossible to say exactly. It is clear that the participations of the various components in the ethnogenesis of Bulgarians in the different ethnographic groups and local populations should not be equal. It is necessary to make a broader comparative analysis including the neighboring populations. Also there is a need of a new study, generalization and analysis of the skeletal materials by regions and by centuries.

CONCLUSION

From the end of 19th century the cephalic index in Bulgaria increases. It reaches its maximum in the generation born around 1940, than there is a tendency for debrachycephalization. It seems, that the secular changes of cephalic index in Bulgaria are due mostly to the changes in the head breadth than in the head length.

Changes do not occur uniformly in all regions – in some of them debrachycephalization can not be found until 1991.

Despite the secular changes a large territorio-population heterogeneity in cephalic index remains which goes back at least to 18th-19th century.

Further studies are needed to establish the roots of this heterogeneity, which is probably due to the different components in the ethnogenesis of Bulgarian people and its ethnographic groups.

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